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BOX PATENT APPLICATION
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File No.: SONYJP 3.0-129
Inventor(s): Ichiro HAMADA
Title : DIGITAL BROADCAST RECEIVER, RECORDING APPARATUS AND DATA RECORDING METHOD

Dear Sir:

Enclosed herewith please find the following documents in the above-identified application for Letters Patent of the United States:

☐	1	Pages of Abstract	☐ Unexecuted Declaration (executed Declaration to follow)
☐	37	Pages of Specification	☐ One (1) return-addressed postcard
☐	27	Number of Claims	PLEASE PROVIDE FILING DATE AND SERIAL NUMBER
☐	9	Sheets of Drawings ☒ A4 ☐ 11"	

Please charge Deposit Account No. 12-1095 in the amount of $836.00, calculated as follows:

Basic Fee			$ 710.00
Additional Fees:			
Total number of claims (including multiple dependent claims):		27	
Total number of claims in excess of 20:	7 x $18		126.00
Number of independent claims: 3			
Number of independent claims minus 3:	0 x $80		0
Fee for multiple dependent claim(s) ($270)			0
TOTAL FILING FEE			$ 836.00

CONVENTION DATE: October 22, 1999 for Japanese Appln. S.N. P11-300612 is claimed.
Priority Document: ☒ Enclosed ☐ Will follow

In the event the actual fee is greater than the payment authorized above, the Patent Office is authorized to charge any deficiency to our Deposit Account No. 12-1095.

Respectfully submitted,

LERNER, DAVID, LITTENBERG,
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DIGITAL BROADCAST RECEIVER, RECORDING APPARATUS AND DATA RECORDING METHOD

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a digital broadcast receiver, a recording apparatus and a data recording method which are suitably used in a digital satellite broadcast system for receiving signals of video data and audio data broadcasted in the form of a transport stream of MPEG (Moving Picture Experts Group) 2 system and recording/reproducing the transport stream thus received in a recording medium such as a digital video tape or the like.

2. Description of the Related Art

Recently, the digital satellite broadcast system has just started to achieve widespread use. In the digital satellite broadcast system, digital video data and digital audio data contained in a digital satellite broadcast are compressed to be packeted, and then transmitted in the form of a transport stream based on the MPEG2 system. In order to receive such a digital satellite broadcast, a digital satellite broadcast receiving decoder called as IRD (Integrated Receiver Decoder) is connected to a television receiver. A transport stream based on MPEG2 which is contained in a digital satellite broadcast signal received by a parabola antenna is demodulated by IRD to extract video and audio packets of a desired program

from the transport stream of MPEG2 thus decoded, and a video signal and an audio signal are decoded from the video and audio packets. These video signal and audio signal are supplied from IRD to the television receiver.

It has been proposed to equip a digital interface of IEEE1394 to IRD for receiving such a digital satellite broadcast. IEEE1394 supports an isochronous transfer mode and an asynchronous transfer mode. In the isochronous transfer mode, a delay time of transmission is compensated, and it is suitably used to transmit a time-sequential data stream such as video data and audio data at a high speed. On the other hand, in the asynchronous transfer mode, it is guaranteed that data can be surely transmitted to a destination node, and thus it is suitably used to surely transmit data such as commands or the like.

When the digital interface of IEEE1394 is equipped to IRD, a digital satellite broadcast receiving and recording/reproducing system can be constructed by connecting IRD and a recording/reproducing apparatus or the like to each other. If such a system is constructed, the transport stream of MPEG2 transmitted with the digital satellite broadcast can be directly recorded/reproduced.

That is, under the recording operation, a transport stream of MPEG2 received at the IRD side is transmitted to the recording/reproducing apparatus through the digital interface

of IEEE1394, and it is directly recorded in a recording medium by the recording/reproducing apparatus. Under the reproducing operation, the transport stream of MPEG2 is reproduced from the recording medium, and the transport stream of MPEG2 thus reproduced is transmitted to IRD through the digital interface of IEEE1394. The transport stream of MPEG2 thus transmitted is decoded by IRD.

When IRD is equipped with the digital interface of IEEE1394 and both of IRD and the recording/reproducing apparatus are connected to each other to construct the digital satellite broadcast receiving and recording/reproducing system as described above, it is expected that a digital video cassette recording/reproducing apparatus using a video cassette which is compatible with a conventional analog system is used as a recording/reproducing apparatus. With such a digital video cassette recording/reproducing apparatus, transport streams can be recorded at a recording rate of 14.1Mpbs. In the case of a stream of SDTV (Standard Definition TV) based on the NTSC system having an aspect ratio of 3:4 and 525 scanning lines, the transmission rate is equal to 8Mbps, for example, and thus if such a digital video cassette recording/reproducing apparatus is used, the transport stream of SDTV can be directly recorded.

However, for a digital satellite broadcast system which will be developed in the future, it is planed that not only

the SDTV broadcast, but also the HDTV (High Definition TV) broadcast are carried out. The HDTV broadcast is defined as a broadcast based on a high definition television having an aspect ratio of 16:9 and 1125 scanning lines, and the transmission rate thereof is equal to 24Mbps, for example. Therefore, with the digital video cassette recording/reproducing apparatus having the recording rate of 14.1Mbps as described above, streams of MPEG2 transmitted in the HDTV system cannot be directly recorded.

Therefore, when an HDTV transport stream is recorded/reproduced by using such a digital video cassette recording/reproducing apparatus, the mode of the recording/reproducing apparatus is switched to a high-speed recording rate.

That is, the recording rate of such a digital video cassette recording/reproducing apparatus is equal to 14.1Mbps as described above, and if the recording time is reduced to a half in the digital video cassette recording/reproducing apparatus as described above, the double amount of data can be recorded. In this case, the recording rate is equal to 28.2Mbps. The transmission rate of the HDTV stream is equal to 24Mbps, for example, and thus if the recording rate is set to 28.2Mbps, the HDTV stream can be sufficiently recorded.

The recording mode of 14.1Mbps serving as the standard is called as an STD mode, and a recording mode which is achieved

by reducing the recording time of the STD mode to a half to enhance the recording rate to 28.2Mbps is called as an HS mode.

If the HS mode whose recording rate is increased to be twice as high as that of the STD mode can be set in addition to the STD mode serving as the standard recording mode, both of the SDTV stream having an aspect ratio of 4:3 and 525 scanning lines and the HDTV stream having an aspect ratio of 16:9 and 1125 scanning lines can be recorded. That is, when signals from IRD are recorded by using the digital video cassette recording/reproducing apparatus in such a system, the STD mode is set if the broadcast to be recorded is SDTV, or the HS mode is set if the broadcast to be recorded is HDTV.

When the recording mode of the digital video cassette recording/reproducing apparatus is set in accordance with whether the broadcast to be recorded is SDTV or HDTV as described above, the recording mode is required to be accurately and correctly set before the digital video cassette recording/reproducing apparatus is allowed to perform the recording operation.

In the conventional system in which IRD is connected to a digital video cassette recording/reproducing apparatus in which both the STD mode and the HS mode can be set, there may occur such a situation that the recording is started regardless of whether a correct recording mode is set or not.

That is, in such a system that IRD is connected to a

digital video cassette recording/reproducing apparatus through IEEE1394, the mode of the digital video cassette recording/reproducing apparatus can be set on the basis of a command from IRD. When such a command is issued from IRD, the digital video cassette recording/reproducing apparatus is set to a recordable state regardless of whether the recording mode corresponding to the transmission rate of a stream being transmitted is set or not.

In this system, when a recording button of the digital video cassette recording/reproducing apparatus is pushed, the digital video cassette recording/reproducing apparatus is set to the recordable state regardless of whether the recording mode corresponding to the transmission rate of a stream being transmitted is set or not.

As described above, in the conventional system may occur such a situation that the recording is started under the state that the right recording mode is not set. Accordingly, there may occur such a situation that the recording mode of the digital video cassette recording/reproducing apparatus is set to the HS mode although the broadcast to be recorded is SDTV, so that the recording efficiency gets vain. Further, the recording mode of the digital video cassette recording/reproducing apparatus is set to the STD mode although the broadcast to be recorded is HDTV, so that overflow of bits occurs and correct data cannot be recorded.

SUMMARY OF THE INVENTION

Therefore, an object of this invention is to provide a digital broadcast receiver, a recording apparatus and a data recording method in which when a stream from a receiver is recorded in a recording/reproducing apparatus, the optimum recording mode corresponding to the transmission rate of the stream can be surely set before the recording of the recording/reproducing apparatus is started.

In order to attain the above object, according to the present invention, a digital broadcast receiver for receiving and decoding a digital broadcast containing video data and audio data transmitted in the form of a transport stream comprises:

interface means for receiving/transmitting transport streams and commands from/to a recording/reproducing apparatus;

means for judging information corresponding to the transmission rate of a transport stream of a digital broadcast received; and

means for generating a setting command of a recording rate for the recording/reproducing apparatus on the basis of the information corresponding to the transmission rate.

Further, according to the present invention, a recording apparatus comprises:

interface means for receiving/transmitting transport

streams and commands from/to a digital broadcast receiver;

recording means for recording a transport stream transmitted from the digital broadcast receiver through the interface means; and

recording rate setting means for setting the recording rate of the recording means in accordance with a set command of the recording rate transmitted from the digital broadcast receiver.

Still furthermore, according to the present invention, a data recording method is characterized in that a digital broadcast receiver for receiving a digital broadcast containing video data and audio data transmitted in the form of a transport stream and decoding the digital broadcast is connected through interface means to a digital recording/reproducing apparatus for recording/reproducing a transport stream from the digital broadcast receiver, and

the receiver judges information corresponding to the transmission rate of a transport stream of a digital broadcast to be received, and generates a set command of the recording rate for a recording/reproducing apparatus on the basis of the information corresponding to the transmission rate.

Accordingly, a system is constructed by connecting the digital broadcast receiver for receiving a digital broadcast containing video data and audio data transmitted in the form of a transport stream through the interface means to the digital

recording apparatus for recording the transport stream from the digital broadcast receiver. The receiver judges the information corresponding to the transmission rate of the transport stream of the digital broadcast received, and generates the set command of the recording rate through the interface for the recording/reproducing apparatus on the basis of the information corresponding to the transmission rate. By transmitting the set command of the recording rate to the recording/reproducing apparatus just before the receiver transmits the stream when the channel is switched, when the program is switched or every predetermined period the optimum recording rate is surely set when the recording operation is started in the recording/reproducing apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing an example of a digital satellite broadcast system to which the present invention is applied;

Fig. 2 is a block diagram showing an example of IRD in the digital satellite broadcast system to which the present invention is applied;

Fig. 3 is a block diagram showing an example of a digital video cassette recording/reproducing apparatus in the digital satellite broadcast system to which the present invention is applied;

Fig. 4 is a flowchart used to explain an embodiment of

the present invention;

Fig. 5 is a flowchart used to explain the embodiment of the present invention;

Fig. 6 is a schematic diagram used to explain a component descriptor;

Fig. 7 is a schematic diagram used to a component content and a component type;

Fig. 8 is a flowchart used to explain the embodiment of the present invention;

Figs. 9A and 9B are flowcharts used to explain the embodiment of the present invention; and

Fig. 10 is a flowchart used to explain the embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be described hereunder with reference to the accompanying drawings.

In Fig. 1, reference numeral 1 represents IRD, reference numeral 2 represents a digital video cassette recording/reproducing apparatus, reference numeral 3 represents a television receiver. A digital satellite broadcast receiving and recording/reproducing system is constructed by IRD 1, the digital video cassette recording/reproducing apparatus 2 and the television receiver 3. IRD 1 and the digital video cassette recording/reproducing

apparatus 2 are equipped with a digital interface of IEEE1394, and IRD 1 and the digital video cassette recording/reproducing apparatus 2 are connected to each other through a cable 8 of the digital interface of IEEE1394.

IRD 1 decodes the reception signal of a digital satellite broadcast to form a video signal and an audio signal. As a system for video signals are known a system (SDTV system) based on the NTSC system having an aspect ratio of 4:3 and a scanning number of 525, and a system (HDTV system) based on a high definition television having an aspect ratio of 16:9 and a scanning number of 1125.

In the digital satellite broadcast, plural programs are multiplexed and transmitted with one carrier. The number of programs which can be multiplexed with one carrier is dependent on the band of transponder of a satellite used for the digital satellite broadcast and the band of a program to be transmitted. In the case of video signals of the SDTV system having a narrow transmission band, programs of many channels can be transmitted with one carrier. In the case of HDTV system, the number of channels which can be transmitted with one carrier is small because the transmission band is broad. Further, there may be a case that a stream of SDTV and a stream of HDTV are transmitted with one carrier.

An antenna terminal of IRD 1 is connected to a low noise converter 5 through a cable 6. The electric wave from a

satellite is transmitted at 12GHz edge. The electric wave from the satellite is converted to signals of 1GHz band, for example, by a low noise converter 5 secured to a parabola antenna 4.

The output of the low noise converter 5 is supplied to the antenna terminal of IRD 1 through the cable 6. In IRD 1, the signal of a desired carrier is selected from the reception signal, and a transport stream of MPEG2 is demodulated. A video packet and an audio packet in a desired program are extracted from this transport stream, and the decode processing is carried out on the video packet and the audio packet to decode the video signal and the audio signal.

The video output terminal and the audio output terminal of IRD 1 are connected to the video input terminal and the audio input terminal of the television receiver 3 through a cable 7. The video signal and the audio signal decoded in IRD 1 are supplied to the video input terminal and the audio input terminal of the television receiver 3, and reception frames of the desired program are displayed on the television receiver 3 and the voice thereof is output therefrom.

The digital video cassette recording/reproducing apparatus 2 performs digital recording and analog recording with the same tape cassette. IRD 1 and the digital video cassette recording/reproducing apparatus 2 are connected to each other through the cable 8 of the IEEE1394 digital interface.

The video output terminal and the audio output terminal of the digital video cassette recording/reproducing apparatus 2 are connected to the video input terminal and the audio input terminal of the television receiver 3 through a cable 9. The antenna terminal of the digital video cassette recording/reproducing apparatus 2 is connected to a ground wave antenna 11 through a cable 10.

In this system, the transport stream of MPEG2 based on the reception output of a digital satellite broadcast received by IRD 1 can be recorded/reproduced in the digital video cassette recording/reproducing apparatus 2.

When the transport stream of MPEG2 based on the reception output of the digital satellite broadcast received by IRD 1 is recorded on a tape cassette mounted on the digital video cassette recording/reproducing apparatus 2, a transport stream of MPEG2 of a desired program is output from IRD1. The transport stream from IRD 1 is supplied to the digital video cassette recording/reproducing apparatus 2 through the cable 8 of IEEE1394, and the transport stream of MPEG2 is recorded on the tape cassette mounted on the digital video cassette recording/reproducing apparatus 2.

The digital video cassette recording/reproducing apparatus 2 can perform analog recording on a tape cassette mounted thereon by performing analog processing on a ground wave broadcast signal. When the ground wave broadcast signal

is subjected to the analog processing to be recorded on the tape cassette, the ground wave broadcast is received by the antenna 11 and then the reception signal is supplied to a ground wave tuner circuit in the digital video cassette recording/reproducing apparatus 2. In the ground wave tuner, a desired channel signal is selected, and an analog video signal and an audio signal are demodulated from the reception signal. The analog video signal and the audio signal are analog-recorded on the tape cassette mounted on the digital video cassette recording/reproducing apparatus 2.

When the video cassette on which the video signal and the audio signal are analog-recorded is reproduced, the video cassette is mounted on the digital video cassette recording/reproducing apparatus 2 to perform the reproducing operation. In the digital video cassette recording/reproducing apparatus 2, the reproduction signal is transmitted to the television receiver 3 through the cable 9, and the reception frames based on the analog signal reproduced from the tape cassette are displayed on the television receiver 3 and the voice thereof is output therefrom. Likewise, the digital video cassette recording/reproducing apparatus 2 can receive an analog video signal from analog equipment such as 8-mm VTR or the like and an analog audio signal, and analog-record the signals on a tape cassette mounted.

The digital video cassette recording/reproducing

apparatus 2 can also subject a ground wave signal to digital processing and record it on a tape cassette mounted.

When an analog ground wave signal is subjected to digital processing and recorded on a tape cassette, the ground wave broadcast signal is received by the antenna 11, and this reception signal is supplied to the ground wave tuner circuit in the digital video cassette recording/reproducing apparatus 2. In this ground wave tuner circuit, a desired channel signal is selected, and an analog video signal and an audio signal are demodulated from the reception signal. The analog video signal and the audio signal are subjected to compression coding according to the format of MPEG2, and digitally recorded on a tape cassette mounted on the digital video cassette recording/reproducing apparatus 2.

When a video cassette on which a video signal and an audio signal of an analog ground wave broadcast are digitally recorded is reproduced, the video cassette is mounted on the digital video cassette recording/reproducing apparatus 2 and reproduced. When the reproduction signal is digitally reproduced in the digital video cassette recording/reproducing apparatus 2, it is output to IRD 1 through the cable 8 of the IEEE1394 interface and reproduced. When the reproduction signal is analog-output, it is subjected to compression-decoding according to the MPEG format, analog-output, transmitted to the television receiver 3

through the cable 7, the reception frames based on the analog signal reproduced from the tape cassette are displayed on the television receiver 3, and the voice thereof is output therefrom. Likewise, the digital video cassette recording/reproducing apparatus 2 can subject the digital processing to the analog video signal and the analog audio signal input from analog equipment such as 8-mm VTR or the like to digitally record the signals on a tape cassette mounted.

Fig. 2 shows the construction of IRD 1. As shown in Fig. 1, for example, the digital satellite broadcast electric wave transmitted through a satellite with electric wave in 12GHz band is received by the parabola antenna 4, and converted to signals of 1GHz band by the low noise converter 5 secured to the parabola antenna 4. The output of the low noise converter 5 is supplied to the tuner circuit 101 of IRD 1 through the cable 6.

On the basis of a control signal from a control CPU (Central Processing Unit) 111, the tuner circuit 101 selects a signal having a desired carrier frequency from the reception signal. The signal of the carrier frequency thus selected is supplied to a demodulation circuit 102. For example, QPSK (Quadrature Phase Shift Keying) demodulation processing is carried out in the demodulation circuit 102. The signal thus demodulated is supplied to an error correction processing circuit 103. In the error correction processing circuit 103,

error correction processing is carried out by using Reed-Solomon coding or Viterbi decoding.

The output of the error correction circuit 103 is supplied to a descrambler 104. The descrambler 104 is supplied with contract information received and also with descrambling key data stored in an IC card 113 mounted in an IC card slot 112. The descrambler 104 descrambles an MPEG transport stream by using the contract information received and the key data of the IC card 113. The MPEG2 transport stream thus descrambled is transmitted to a demultiplexer 105.

The demultiplexer 105 separates a desired packet from the stream from the descrambler 104 on the basis of an instruction from CPU 111. The transmission packet is equipped with a packet identifier (PID) at the header portion thereof. In the demultiplexer 105, a video packet and an audio packet of a desired program are extracted on the basis of PID. The video packet of the desired program is transmitted to an MPEG2 video decoder 106, and the audio packet is transmitted to an MPEG audio decoder 108.

The MPEG2 video decoder 106 receives the packet of the video signal from the demultiplexer 105, and carries out the decoding processing of MPEG2 system to form video data. The video data are supplied to a format converter 107. In the format converter 107, the digital video signal output from the MPEG video decoder is converted to a video signal of SDTV system

or a video signal of HDTV system.

The output of the format converter 107 is supplied to the television receiver 3 through an analog video signal terminal (not shown).

The MPEG audio decoder 108 receives an audio packet from the demultiplexer 105 and carries out the audio decoding processing of MPEG system to form audio data before data compression. The audio data thus decoded are converted to the analog audio signal in a D/A converter 109, and then supplied to the television receiver 3 through an analog audio output terminal (not shown).

Further, in the demultiplexer 105, information necessary for limited reception or SI (Service Information) necessary for services such as EPG (Electric Program Guide), etc. are extracted. These information is transmitted to CPU 11.

An operation instruction to IRD 1 is carried out by a remote controller 115. A remote control signal from the remote controller 115 is received by a photodetecting portion 114, and supplied to CPU 111. Further, a modem 117 is provided, and charging information is transmitted to a broadcast station or charging center through a telephone line through the modem 117.

The setting of the carrier frequency of the reception signal is carried out on the basis of a channel setting signal input by an audience. When a desired program is set, the reception signal of the tuner 101 is set to a predetermined

carrier frequency by referring to NIT (Nettwork Information Table). By referring to PAT (Program association Table) which is information on the channel at the carrier frequency, a packet of PID of PMT (Program Map Table) which is information on a desired channel is extracted. PID of the packet of the video, audio and additional data of the desired channel is obtained by referring to PMT.

IRD 1 is equipped with a digital interface 110 of IEEE1394. The transport stream can be input/output between the demultiplexer 105 and the interface 110 of IEEE1394.

When the digital recording is carried out in the digital video cassette recording/reproducing apparatus 2, the transport stream of MPEG2 comprising a video packet and an audio packet of a desired program is transmitted from the demultiplexer 105 through the digital interface 110 of IEEE1394 toward the digital video cassette recording/reproducing apparatus 2.

When the transport stream of MPEG2 reproduced in the digital video cassette recording/reproducing apparatus 2 is decoded, the transport stream of MPEG2 from the digital video cassette recording/reproducing apparatus 2 is input through the IEEE1394 digital interface 110, and transmitted to the demultiplexer 105. In the demultiplexer 105, the video packet and the audio packet are separated from the transport stream of MPEG2. The video packet is transmitted to the MPEG2 video

decoder 106 to be decoded. The audio packet is transmitted to the MPEG audio decoder 108 to be decoded.

IEEE1394 supports both an isochronous transmission mode and an asynchronous transmission mode. When the isochronous transmission mode is used, it is suitably used to transmit data such as MPEG2 streams at high speed. Further, the asynchronous mode is suitably used to transmit commands.

As described later, in IRD 1 to which the present invention is applied, a recording rate indicating command can be transmitted through the IEEE1394 digital interface 110. The recording rate indicating command is a command for setting a recording rate to equipment connected through IEEE1394.

Fig. 3 shows the construction of the digital video cassette recording/reproducing apparatus 2. The digital video cassette recording/reproducing apparatus 2 carries out digital recording/reproduction and analog recording/reproduction as described above. In order to carry out the digital recording/reproduction are provided a digital recording processing circuit 213 and a digital reproduction processing circuit 218. In order to carry out the analog recording/reproduction processing are provided an analog recording processing circuit 204 and an analog reproduction processing circuit 208.

The overall control is carried out by CPU 224. An operating instruction to the digital video cassette

recording/reproducing apparatus 2 is carried out by a remote controller 227, and a remote control signal from the remote controller 227 is received by a photodetecting portion 226 and supplied to CPU 224. A non-volatile memory 225 is connected to CPU 224.

When a transport stream from IRD 1 is recorded, the MPEG2 transport stream is input from IRD 1 through the IEEE1394 digital interface 223. The MPEG2 transport stream is supplied to the digital recording processing circuit 213 through a switch circuit 212. In the digital recording processing circuit 213, the error correction coding processing and the recording modulation processing are carried out on the data of this transport stream. The output of the digital recording processing circuit 213 is supplied to a head 214, whereby the transport stream from IRD 1 is recorded on a tape 206 of a tape cassette mounted on the digital video cassette recording/reproducing apparatus 2.

When the tape cassette on which the transport stream of MPEG2 is recorded is reproduced, the reproduction signal of the tape 206 is reproduced in the head 217, and the output of the head 217 is supplied to the digital reproduction processing circuit 218. In the digital reproduction processing circuit 218, the demodulation processing and the error correction processing are carried out. The output of the digital reproduction processing circuit 218 is supplied through the

switch circuit 220 to the IEEE1394 digital interface 223, and the transport stream thus reproduced is supplied to IRD 1.

The digital video cassette recording/reproducing apparatus 2 is equipped with a mode switching circuit 230. The recording mode can be set to any one of the STD mode and the HS mode by the mode switching circuit 230. In the STD mode, data can be recorded/reproduced at a rate of 14.1Mbps, for example. This is suitable to record/reproduce an SDTV stream having a transmission rate of 8Mbps. In the HS mode, data can be recorded/reproduced at 28.2Mbps, for example. This is suitable to record/reproduce an HDTV stream having a transmission rate of 24Mbps.

When the ground wave is analog-recorded, the signal received by the antenna 11 is supplied to a ground wave tuner 201. In the ground wave tuner 201, the reception signal of a desired broadcast is selected, and analog video and audio signals of NTSC system are demodulated from the reception signal. The analog video signal and the analog audio signal are supplied to the analog recording processing circuit 204 through switch circuits 202, 203. In the analog recording processing circuit 204, the recording processing is carried out on the video signal and the audio signal. That is, the brightness signal is subjected to FM modulation, the chroma signal is converted to a low-band frequency, and the audio signal is subjected to FM modulation. These signals are

multiplexed and supplied to the head 205. The analog video and audio signals are recorded on the tape 206 of the mounted tape cassette by the head 205.

Further, the analog video signal and the analog audio signal supplied from analog equipment (for example, 8mm VTR) connected to the outside can be analog-recorded. The analog video signal and the analog audio signal supplied from an analog external input terminal 215 are supplied to the analog recording processing circuit 204 through the switch circuit 203. The recording processing of the video and audio signals is carried out in the analog recording processing circuit 204. The subsequent processing is the same as the case where the ground wave broadcast is analog-recorded as described above.

When the analog-recorded tape cassette is reproduced, the signal of the tape 206 is reproduced by the head 207, and supplied to the analog reproduction processing circuit 208. In the analog reproduction processing circuit 208, the reproduction is carried out on the video signal and the audio signal. That is, the FM-modulated brightness signal, the low-band converted chroma signal and the FM-modulated audio signal are extracted from the reproduction signal. The FM-modulation processing is carried out on the FM-modulated brightness signal to demodulate the brightness signal, the low-band converted chroma signal is returned to the chroma signal of the carrier frequency of 3.58MHz. The video signal

is formed from the brightness signal and the video signal. The FM demodulation processing is carried out on the FM-demodulated audio signal to demodulate the audio signal. The video signal and the audio signal are output from the analog output terminal 210.

In the digital video cassette recording/reproducing apparatus 2, the signal of the ground wave broadcast and the analog video signal and the analog audio signal supplied from analog equipment connected to the external can be digitally recorded. When the ground wave broadcast signal is digitally recorded, the output of the ground wave tuner 201 is supplied through the switch circuit 202 to an A/D converter 216 to be converted to the digital video signal and the digital audio signal, and then supplied to an MPEG encoder 211. The MPEG encoder 211 carries out the compression coding processing on the digital video signal and the digital audio signal according to the format of MPEG2. The compression-coded digital video signal and digital audio signal are supplied to the digital recording processing circuit 213 through the switch circuit 212. In the digital recording processing circuit 213, the error correction processing and recording modulation processing are carried out, and the processed signal is supplied to the head 214, whereby the signal of the ground wave broadcast is digitally recorded on the tape 206 of the tape cassette mounted in the digital video cassette recording/reproducing apparatus

2.

When a signal supplied from analog equipment connected to the external is digitally recorded, the analog video signal and the analog audio signal supplied from the analog external input terminal 215 are supplied to the A/D converter 216 to be converted to the digital video signal and the digital audio signal, and then these signals are supplied to an MPEG encoder 211. The subsequent processing is the same as the case where the signal of the ground wave broadcast is digitally recorded as described above.

When the signal of the ground wave broadcast thus digitally recorded and the signal supplied from the analog equipment connected to the external are reproduced, the reproduction signal of the tape 206 is reproduced by the head 217, and the output of the head 217 is supplied to the digital reproduction processing circuit 218. The demodulation processing and the error correction processing are carried out in the digital reproduction processing circuit 218. The output of the digital reproduction processing circuit 218 is supplied through the switch circuit 220 to an MPEG decoder 221. In the MPEG decoder 221, compression-expanding processing is carried out on the digital video signal and the digital audio signal which have been compression-coded. The digital video signal and the audio signal thus decoded are supplied to a D/A converter 222 to be converted to the analog video signal and

the analog audio signal, and then output from the analog output terminal 210 through the switch circuit 209.

As described above, in the system to which the present invention is applied, the transport stream is sent from IRD 1 to the digital video cassette recording/reproducing apparatus 2 through the IEEE1394 interface, and the transport stream of the broadcast received by IRD 1 can be directly recorded in the digital video cassette recording/reproducing apparatus 2. In the system to which the present invention is applied, the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2, and the recording mode of the digital video cassette recording/reproducing apparatus can be set on the basis of the command.

In Fig. 1, the digital video cassette recording/reproducing apparatus 2 is connected to IRD 1 through the IEEE1394 digital interface cable 8, and the recording rate indicating command of "STD mode" or "HS mode" is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2. When the recording command of "STD mode" is transmitted, the digital video cassette recording/reproducing apparatus is set to the STD mode of the recording rate of 14.1Mbps, and when the recording command of "HS mode" is transmitted, it is set to the HS mode of the recording rate of 28.2Mbps.

In the case of some types of recording/reproducing apparatuses connected to IRD 1, there may be a case where the recording/reproducing apparatuses cannot be set to a recording rate requested by the recording rate indicating command. When the recording rate setting command is transmitted from IRD 1, but the recording rate conformed with the request cannot be set, the equipment may return a response indicating the fact that the recording rate cannot be set, and IRD 1 may display an alarm in accordance with this response.

When the transport stream from IRD 1 is recorded in the digital video cassette recording/reproducing apparatus 2, the transport stream is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2. There are cases where the transport stream is an HDTV transport stream and where the transport stream is an SDTV transport stream. The digital video cassette recording/reproducing apparatus 2 is required to be set to the HS mode when the HDTV transport stream is recorded, or to the STD mode when the SDTV transport stream is recorded.

Therefore, in the embodiment of the present invention, when there is a probability that the transmission rate of the transport stream transmitted from IRD 1 through IEEE1394 is changed, the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 before the transmission rate is changed.

That is, when IRD 1 and the digital video cassette recording/reproducing apparatus 2 are connected through the IEEE1394 interface cable 8, the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2.

When the transport stream is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2, the recording rate setting command is transmitted from IRD 1 before the recording is started.

In the digital satellite broadcast services, it is assumed that a channel transmitted with SDTV frames like a news channel and a channel transmitted with HDTV frames like a cinema channel are separated from each other. Accordingly, when the channel is switched, the recording rate setting command is transmitted from IRD 1 to accurately set the recording mode of the digital video cassette recording/reproducing apparatus 2.

Further, it is also assumed that even in the case of the same channel the SDTV stream and the HDTV stream are switched to each other every program like HDTV is set when a movie is broadcasted and SDTV is set when a news is broadcasted. Accordingly, when the program is changed, the recording rate setting command is transmitted from IRD 1 to accurately set the recording mode of the digital video cassette recording/reproducing apparatus 2.

Figs. 4 and 5 are flowcharts showing the processing of transmitting a recording rate indicating command before the transmission rate is changed when there is a probability that the transmission rate of a transport stream transmitted from IRD 1 through the IEEE1394 interface is changed.

Fig. 4 shows the processing when equipment is connected. In Fig. 4, IRD 1 judges whether the digital video cassette recording/reproducing apparatus 2 is connected through the IEEE1394 interface (step S1). If it is judged that the digital video cassette recording/reproducing apparatus 2 is connected to IRD 1, the recording rate setting command corresponding to the stream to be transmitted is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 (step S2).

When IRD 1 and the digital video cassette recording/reproducing apparatus 2 are connected through the IEEE1394 interface cable 8 through the above processing, the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2.

Fig. 5 shows the processing when data are transmitted after equipment is connected. In Fig. 5, it is judged whether there is a transmission request of a transport stream from IRD 1 to the digital video cassette recording/reproducing apparatus 2 (step S11). If it is judged that there is any

transmission request, the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 just before the stream is transmitted (step S12). After the recording rate indicating command is transmitted, the transport stream is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 (step S13).

It is judged by a user whether the reception channel is switched while the transport stream is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 (step S14). If it is judged that the reception channel is switched, the recording rate indicating command corresponding to the transmission rate of the stream of the channel after the switching operation is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 (step S15), and the processing returns to the step S13.

If it is judged in step S14 that the reception channel has not been switched, it is judged whether the program is switched or not (step S16). If it is judged that the program is switched, the recording rate indicating command corresponding to the transmission rate of the stream of the program after the switching is transmitted to the digital video cassette recording/reproducing apparatus 2 (step S17), and the processing returns to the step S13.

When the transport stream is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 through the above processing, a setting command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 just before the recording is started. When the channel is switched, the recording rate setting command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2, and further when the program is switched, the recording rate setting command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2.

The recording rate setting command transmitted from IRD 1 to the digital video cassette recording apparatus 2 is generated in accordance with whether a broadcast which is currently received or will be received by IRD1 is SDTV or HDTV. It is judged from the table of PMT whether the stream of the reception channel is an SDTV stream or an HDTV stream.

That is, the transport stream of the digital satellite broadcast contains information called as SI (Service Information). SI has the table of PMT (Program Map Table), and the table of PMT contains information for indicating the content of each channel with a component descriptor as shown in Fig. 6.

In Fig. 6, stream_content (component content) is a 4-bit field, and this field means the type of the stream (picture,

voice, data) and is encoded according to the table show in Fig. 7. Component_type (component type) is a 8-bit field, and in this field the type of the component such as picture, voice, data is encoded according to the table shown in Fig. 7. Component_tag is a 8-bit field, and it is a label for identifying the component stream. ISO_639_language_code (language code) is a 24-bit field, and this language code identifies the language of the component (voice or data) and the language of a character description contained in the descriptor thereof.

On the basis of the component content and the description of the component identification shown in Fig. 7, it is judged whether the picture received is SDTV or HDTV. That is, if the component content is "0x01" and the component type is "0x01", the program is broadcasted in the SDTV mode (525 in scanning number, 4:3 in aspect ratio), and if the component content is "0x01" and the component type is "0xB2", the program is broadcasted in the HDTV mode (1125 in scanning number, 16:9 in aspect ratio).

The judgment as to whether the program being broadcasted is switched or not is made from EIT (Event Information Table). A program name, a program start time, etc. are described in the table of EIT. By using EIT, it can be judged whether a program which is about to be received is HDTV or SDTV.

As a manner of transmitting programs and additional

information, various methods have been proposed in addition to the broadcast for transmitting PMT or EIT as described above. The judgment of the transmission rate of the stream of a program being currently received or a program which is about to be switched is not limited to one using PMT or EIT as described above, and it is suitably determined in consideration of the transmission manner of transmitting programs and additional information every broadcast.

With respect to the recording rate indicating command, it is not set as a command expressing the recording mode itself like "STD mode" or "HS mode", but a necessary recording rate value may be contained in the command. For example, in case of an SDTV transport stream, "mode of 8Mbps or more is set", and in case of an HDTV transport stream, "mode of 24Mbps or more is set". If the value itself of a necessary recording rate itself is contained in the command, it is sufficient to set a mode having a recording rate above the necessary recording rate at an equipment side connected to IRD 1.

In the above embodiment, when there is a probability that the transmission rate of the bit stream of MPEG2 output from IRD 1 through the interface of IEEE1394 is changed, specifically when IRD 1 and the digital video cassette recording/reproducing apparatus 2 are mounted just before the stream is transmitted when the channel is switched, when the program is changed, the recording rate indicating command is

transmitted. However, a modification may be made so that all of them are not used, and they are used in combination.

The recording rate indicating command may be surely transmitted from IRD 1 every predetermined time (for example, every 1 second). If the recording rate indicating command is transmitted every predetermined time at all times, the proper recording mode corresponding to the transmission rate of the stream from IRD 1 is surely set.

That is, as shown in Fig. 8, it is judged whether the predetermined time elapses (step S21), and if the predetermined time is judged to elapse, the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 (step S22).

Further, a modification may be made so that a command for inquiring about the recording mode is prepared, and if the recording mode inquiring command is received at the IRD 1 side, the recording rate indicating command is transmitted. With this modification, in the digital video cassette recording/reproducing apparatus 2, the transmission rate of the stream is checked and then the recording rate can be set just before the recording operation.

That is, as shown in Fig. 9A, it is judged at the digital video cassette recording/reproducing apparatus 2 side whether a recording button is pushed or not (step S31). If the recording button is pushed, the recording mode inquiring command is

transmitted (step S32).

At the IRD 1 side, it is judged as shown in Fig. 9B whether the recording mode inquiring command is received or not (step S41), and if the recording mode inquiring command is received, the recording rate indicating command is transmitted (step S42).

The digital video cassette recording/reproducing apparatus 2 side waits to receive the recording rate indicating command (step S33) as shown in Fig. 9A (step S33), and if the recording rate indicating command from IRD 1 is received, the recording rate is set in accordance with the recording rate indicating command (step S34).

When the MPEG2 stream output from IRD 1 through the IEEE1394 interface is recorded by the digital video cassette recording/reproducing apparatus 2, the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 just before the recording. Therefore, when the recording operation is started by the digital video cassette recording/reproducing apparatus 2, the proper recording mode can be surely set.

If the recording rate indicating command is transmitted from IRD 1 to the digital video cassette recording/reproducing apparatus 2 before the recording is started in the digital video cassette recording/reproducing apparatus 2 as in the case of the above embodiment, the recording rate can be set properly

both even when the stream being received is HDTV and even when it is SDTV, and the stream from IRD 1 can be recorded in the digital video cassette recording/reproducing apparatus 2. The transmission rate may be changed in the middle of the recording. Mere transmission of the recording rate indicating command from IRD 1 to the digital video cassette recording/reproducing apparatus 2 before the recording is started cannot support the case where the transmission rate is changed in the middle of the recording operation.

Therefore, in such a case that the transmission rate of the stream is changed in the middle of the recording operation, the recording operation is temporarily stopped, and the recording mode is reset.

Fig. 10 shows the processing in such a case that the transmission rate of the stream is changed during the progress of recording the transport stream from IRD 1 in the digital video cassette recording/reproducing apparatus 2. That is, it shows the processing when SDTV is switched to HDTV or HDTV is switched to SDTV at the program switching time in such a case that plural programs are continuously recorded.

In Fig. 10, it is judged in IRD 1 whether the recording is being carried out in the digital video cassette recording/reproducing apparatus 2 (step S51). If it is under recording operation, the broadcast being received is switched from SDTV to HDTV or from HDTV to SDTV if the recording is being

carried out, and it is judged whether the transmission rate of the stream is changed (step S52). When the transmission rate of the stream is switched in the progress of the recording operation, a recording stop command is issued from IRD 1 to the digital video cassette recording/reproducing apparatus 2 (step S53).

When receiving the recording stop command, the digital video cassette recording/reproducing apparatus 2 stops the recording and returns an acknowledge command to IRD 1.

At the IRD 1 side it is judged whether the acknowledge command is received or not (step S54). If the acknowledge command is received, the recording rate indicating command is transmitted (step S55) and then a recording command is returned (step S56).

When the transmission rate of the stream of the broadcast being received is switched in the progress of the recording operation through the above processing, the recording mode is switched in accordance with the stream of the broadcast being received after the recording is temporarily stopped, and then the recording operation is resumed. Accordingly, the variation of the transmission rate of the received broadcast in the progress of the recording operation can be supported.

WHAT IS CLAIMED IS

1. A digital broadcast receiver for receiving and decoding a digital broadcast containing video data and audio data which are transmitted in the form of a transport stream, comprising:

interface means through which a transport stream and a command are transmitted/received to/from a recording/reproducing apparatus;

judging means for judging information corresponding to a transmission rate of a transport stream of a digital broadcast received; and

recording rate setting command generating means for generating a recording rate setting command for said recording/reproducing apparatus on the basis of the information corresponding to the transmission rate.

2. The digital broadcast receiver as claimed in claim 1, wherein said recording rate setting command generating means generates the recording rate setting command when said recording/reproducing apparatus is connected to said digital broadcast receiver through said interface means.

3. The digital broadcast receiver as claimed in claim 1, wherein said recording rate setting command generating means generates the recording rate setting command just before the transport stream is transmitted to said recording/reproducing apparatus.

4. The digital broadcast receiver as claimed in claim 1,

wherein said recording rate setting command generating means generates the recording rate setting command before the recording in said recording/reproducing apparatus is started.

5. The digital broadcast receiver as claimed in claim 1, wherein said recording rate setting command generating means generates the recording rate setting command when a reception channel is switched.

6. The digital broadcast receiver as claimed in claim 1, wherein said recording rate setting command generating means generates the recording rate setting command when a broadcast program is varied.

7. The digital broadcast receiver as claimed in claim 1, wherein said recording rate setting command generating means generates the recording rate setting command every predetermined period.

8. The digital broadcast receiver as claimed in claim 1, wherein said recording rate setting command generating means generates the recording rate setting command when a request command is received.

9. The digital broadcast receiver as claimed in claim 1, wherein when the transmission rate of the transport stream is changed in the progress of the recording operation in said recording/reproducing apparatus, said recording rate setting command generating means temporarily stops the recording operation and generates the recording rate setting command

newly.

10. The digital broadcast receiver as claimed in claim 1, wherein the information corresponding to the transmission rate of the transport stream of the digital broadcast received is information indicating a high definition television broadcast or a standard television broadcast.

11. The digital broadcast receiver as claimed in claim 1, wherein when the recording rate corresponding to the recording rate setting command thus generated cannot be set, an alarm is displayed in said recording/reproducing apparatus.

12. The digital broadcast receiver as claimed in claim 1, wherein said interface means is an IEEE1394 interface.

13. A recording apparatus having comprising:

interface means for transmitting/receiving a transport stream and a command to/from a digital broadcast receiver;

recording means for recording the transport stream transmitted from said digital broadcast receiver through said interface means; and

recording rate setting means for setting a recording rate of said recording means in accordance with a recording rate setting command transmitted from said digital broadcast receiver.

14. The recording apparatus as claimed in claim 9, further comprising means for generating a request command for setting the recording rate to said digital broadcast receiver.

15. The recording apparatus as claimed in claim 9, wherein said interface means is an IEEE1394 interface.

16. A data recording method, characterized in that a digital broadcast receiver for receiving and decoding a digital broadcast in which video data and audio data are transmitted in the form of a transport stream is connected through interface to a recording/reproducing apparatus for recording/reproducing the transport stream transmitted from said digital broadcast receiver, said receiver judges information corresponding to a transmission rate of a transport stream of a digital broadcast received, and a recording rate setting command is generated to said recording/reproducing apparatus on the basis of the information corresponding to the transmission rate.

17. The data recording method as claimed in claim 16, wherein the recording rate setting command is generated when the recording/reproducing apparatus is connected through said interface means.

18. The data recording method as claimed in claim 16, wherein the recording rate setting command is generated just before the transport stream is transmitted to said recording/reproducing apparatus.

19. The data recording method as claimed in claim 16, wherein the recording rate setting command is generated before the recording operation in said recording/reproducing apparatus

is started.

20. The data recording method as claimed in claim 16, wherein the recording rate setting command is generated when a reception channel is switched.

21. The data recording method as claimed in claim 16, wherein the recording rate setting command is generated when a broadcast program is varied.

22. The data recording method as claimed in claim 16, wherein the recording rate setting command is generated every predetermined period.

23. The data recording method as claimed in claim 16, wherein said recording/reproducing means generates the recording rate setting request command to said digital broadcast receiver just before starting the recording operation, and said receiver generates the recording rate setting command when receiving the request command from said recording/reproducing apparatus.

24. The data recording method as claimed in claim 16, wherein when the transmission rate of the transport stream is changed in the progress of the recording operation in said recording/reproducing apparatus, the recording operation is temporarily stopped and the recording rate setting command is newly generated.

25. The data recording method as claimed in claim 16, wherein the information corresponding to the transmission rate of the

transport stream of the digital broadcast received is information identifying whether the broadcast is an high-definition television broadcast or a standard television broadcast.

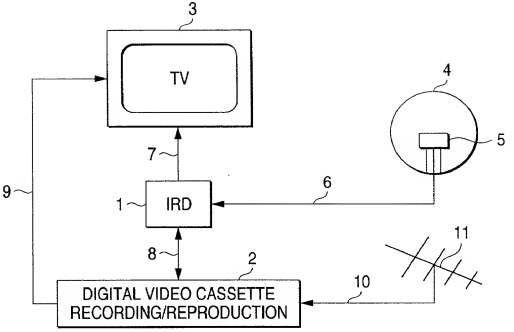
26. The data recording method as claimed in claim 16, when the recording rate corresponding to the recording rate setting command thus generated cannot be set in said recording/reproducing apparatus, a response indicating the fact is returned.

27. The data recording method as claimed in claim 16, wherein said interface means is an IEEE1394 interface.

ABSTRACT OF THE DISCLOSURE

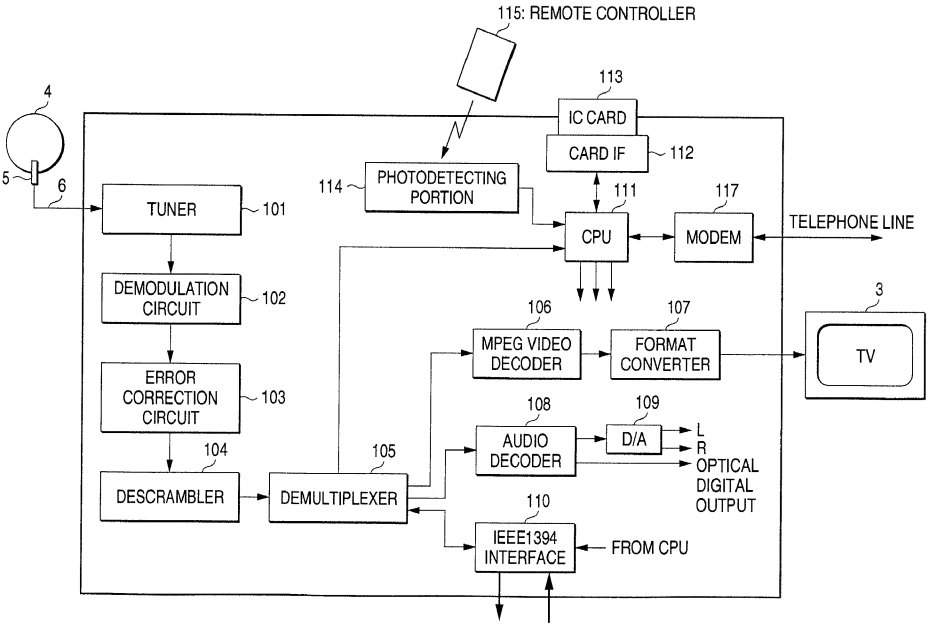
A digital broadcast receiver for receiving a digital broadcast containing video data and audio data transmitted in the form of a transport stream is connected through an interface to a digital recording apparatus for recording the transport stream from the digital broadcast receiver to construct a system. The receiver judges information corresponding to the transmission rate of the transport stream of the digital broadcast received, and transmits a setting command of the recording rate through the interface to the recording/reproducing apparatus on the basis of the information corresponding to the transmission rate. Just before the stream is transmitted from the receiver, the setting command of the recording rate is transmitted to the recording/reproducing apparatus when the channel is switched, when the program is switched or every predetermined period, so that the optimum recording rate is surely set when the recording is started in the recording/reproducing apparatus. The optimum recording mode corresponding to the transmission rate of a stream can be surely set before the recording is started in a recording/reproducing apparatus when a stream from a satellite broadcast receiver is recorded in the recording/reproducing apparatus.

FIG. 1


3
TV
4
5
7
9
1
IRD
6
8
2
11
10
DIGITAL VIDEO CASSETTE
RECORDING/REPRODUCTION

D0020T "28626960

FIG. 2



0002017826960

FIG. 3

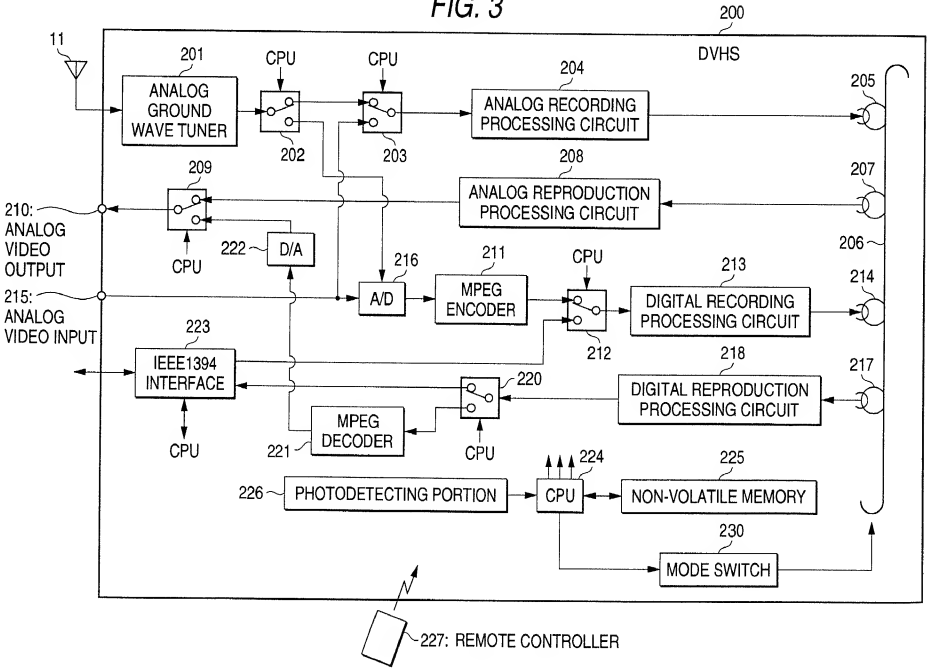


FIG. 4

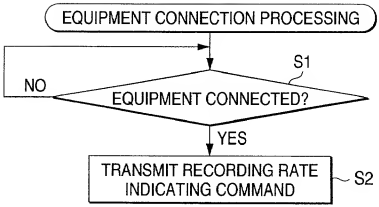

EQUIPMENT CONNECTION PROCESSING
S1
NO
EQUIPMENT CONNECTED?
YES
TRANSMIT RECORDING RATE INDICATING COMMAND
S2

FIG. 5

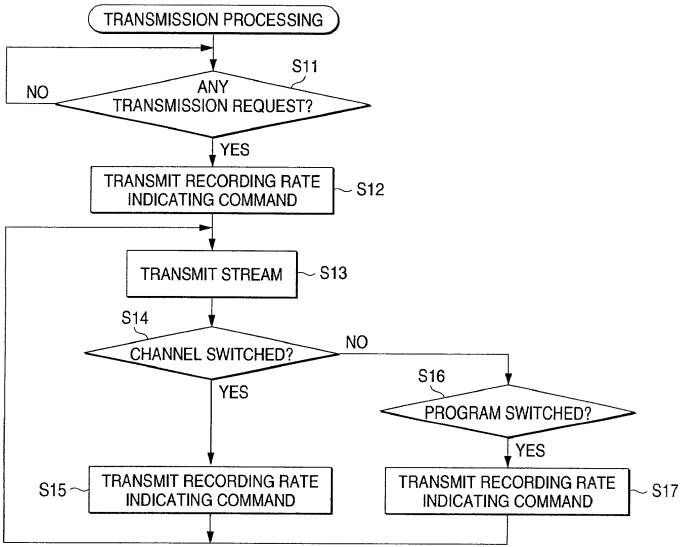

TRANSMISSION PROCESSING
S11
NO
ANY TRANSMISSION REQUEST?
YES
TRANSMIT RECORDING RATE INDICATING COMMAND
S12
TRANSMIT STREAM
S13
S14
CHANNEL SWITCHED?
NO
YES
S16
PROGRAM SWITCHED?
YES
S15
TRANSMIT RECORDING RATE INDICATING COMMAND
TRANSMIT RECORDING RATE INDICATING COMMAND
S17

FIG. 6

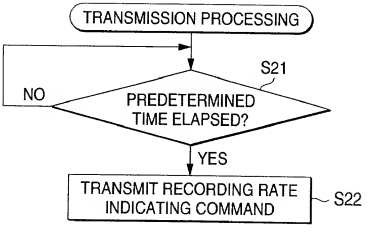
COMPONENT DESCRIPTOR

DATA STRUCTURE	BIT NUMBER	BIT SEQUENCE EXPRESSION
component_descriptor () {		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
reserved_future_use	4	bslbf
stream_content	4	uimsbf
component_type	8	uimsbf
component_tag	8	uimsbf
ISO_639_language_code	24	bslbf
for (i = 0;i < N;i++) {		
text_char	8	uimsbf
}		
}		

FIG. 7

COMPONENT CONTENT	COMPONENT TYPE	DESCRIPTOR
0x00	0x00-0xFF	RESERVE FOR FUTURE USE
0x01	0x00	RESERVE FOR FUTURE USE
0x01	0x01	PICTURE 480i (525i), ASPECT RATIO 4:3
0x01	0x02	PICTURE 480i (525i), ASPECT RATIO 16:9, PAN VECTOR
0x01	0x03	PICTURE 480i (525i), ASPECT RATIO 16:9, NO PAN VECTOR
0x01	0x04	PICTURE 480i (525i), ASPECT RATIO > 16:9
0x01	0x05-0xA0	RESERVE FOR FUTURE USE
0x01	0xA1	PICTURE 480p (525p), ASPECT RATIO 4:3
0x01	0xA2	PICTURE 480p (525p), ASPECT RATIO 16:9, PAN VECTOR
0x01	0xA3	PICTURE 480p (525p), ASPECT RATIO 16:9, NO PAN VECTOR
0x01	0xA4	PICTURE 480p (525p), ASPECT RATIO > 16:9
0x01	0xA5-0xB0	RESERVE FOR FUTURE USE
0x01	0xB1	PICTURE 1080i (1125i), ASPECT RATIO 4:3
0x01	0xB2	PICTURE 1080i (1125i), ASPECT RATIO 16:9, PAN VECTOR
0x01	0xB3	PICTURE 1080i (1125i), ASPECT RATIO 16:9, NO PAN VECTOR
0x01	0xB4	PICTURE 1080i (1125i), ASPECT RATIO > 16:9
0x01	0xB5-0xFF	RESERVE FOR FUTURE USE
0x02	0x00	RESERVE FOR FUTURE USE
0x02	0x01	VOICE, SINGLE MONAURAL
0x02	0x02	VOICE, DUAL MONAURAL
0x02	0x03	VOICE, STEREO (2 CHANNELS)
0x02	0x04	VOICE, PLURAL LANGUAGES, MULTICHANNEL
0x02	0x05	VOICE, SURROUND
0x02	0x06-0x3F	RESERVE FOR FUTURE USE
0x02	0x40	VOICE EXPLANATION FOR VISUAL DISORDER
0x02	0x41	VOICE FOR HEARING DISORDER
0x02	0x42-0xAF	RESERVE FOR FUTURE USE
0x02	0xB0-0xFE	DEFINITION OF BUSINESS MAN
0x02	0xFF	RESERVE FOR FUTURE USE
0x03-0x0B	0x00-0xFF	RESERVE FOR FUTURE USE
0x0C-0x0F	0x00-0xFF	DEFINITION OF BUSINESS MAN

FIG. 8



0002017.7862996.0

FIG. 9A

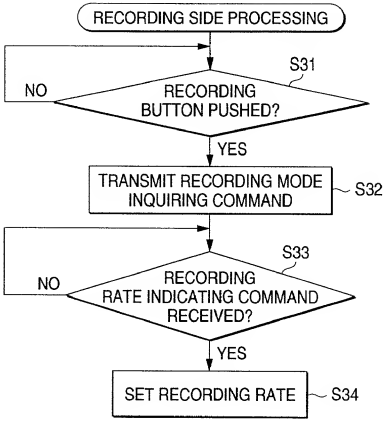
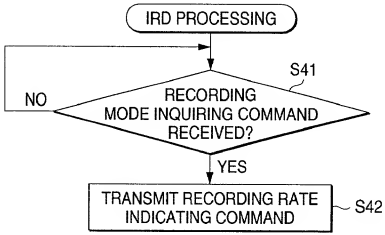
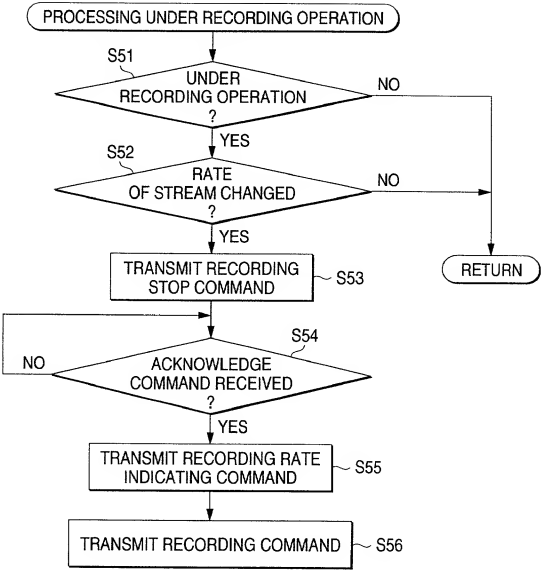


FIG. 9B



US 6,925,287 B2

FIG. 10


PROCESSING UNDER RECORDING OPERATION
S51
UNDER RECORDING OPERATION ?
NO
YES
S52
RATE OF STREAM CHANGED ?
NO
YES
TRANSMIT RECORDING STOP COMMAND
S53
RETURN
S54
NO
ACKNOWLEDGE COMMAND RECEIVED ?
YES
TRANSMIT RECORDING RATE INDICATING COMMAND
S55
TRANSMIT RECORDING COMMAND
S56

PTO/SB/106 (8-96)
Approved for use through 9/30/98. OMB 0651-0032
Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Declaration and Power of Attorney For Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

JC912 U.S. PTO
09/692987
10/20/00

09692987 - 102000

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Digital Broadcast Receiver, Recording Apparatus and Data Recording Method

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the specification of which is attached hereto unless the following box is checked:

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Prior Foreign Application(s)
外国での先行出願

(Number) (番号)	(Country) (国名)	(Day/Month/Year Filed) (出願年月日)	Priority Not Claimed 優先権主張なし
P11-300612	Japan	22 October 1999	☐
			☐

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith *(list name and registration number)*

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(第三以降の共同発明者についても同様に記載し、署名をすること)

(Supply similar information and signature for third and subsequent joint inventors.)